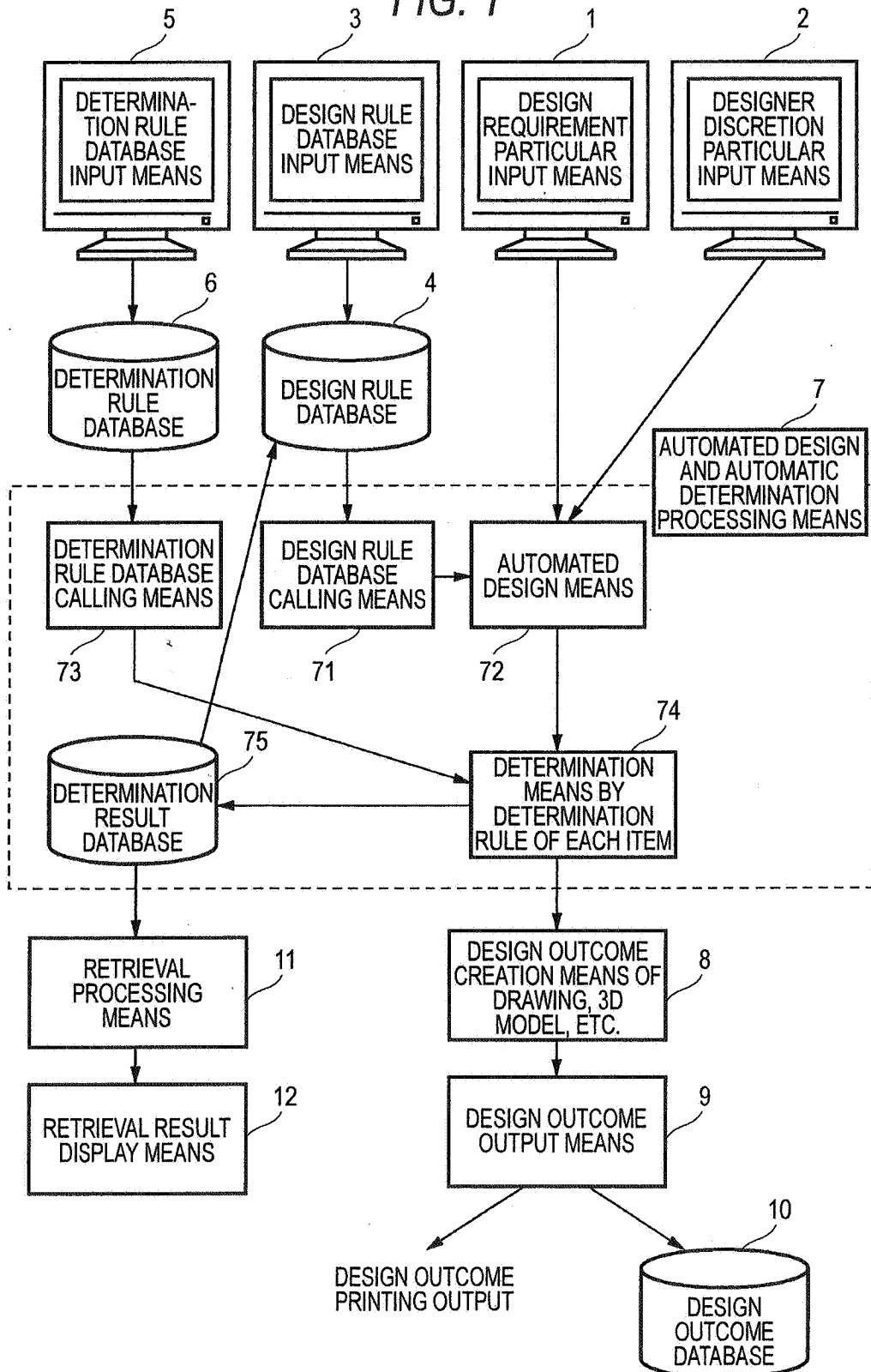


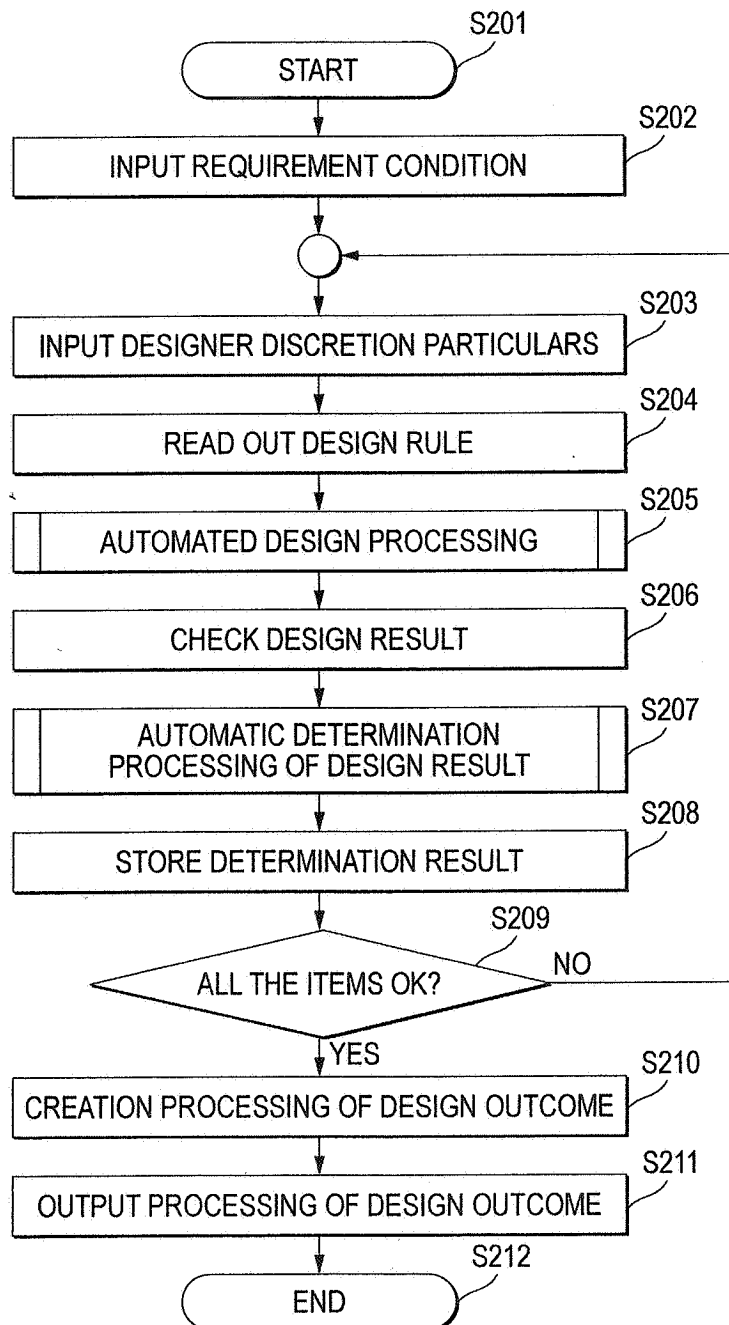
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FIG. 1



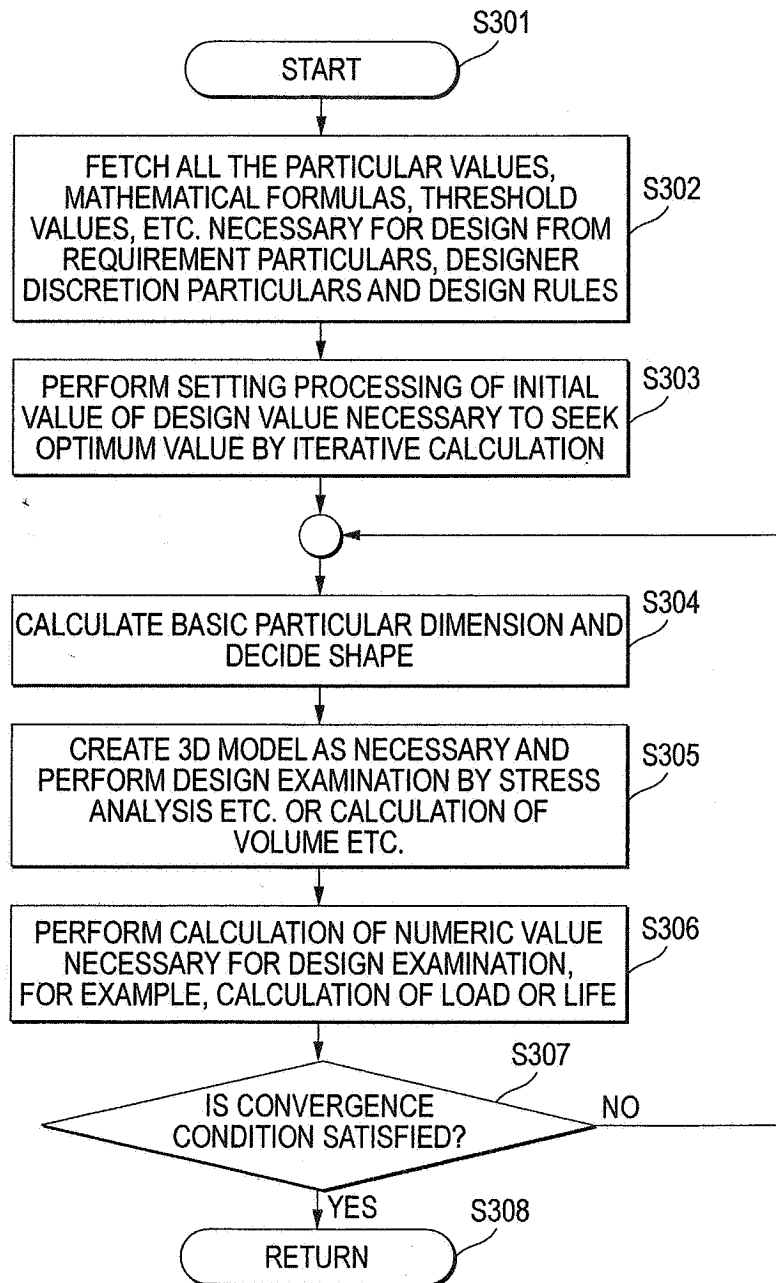
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FIG. 2



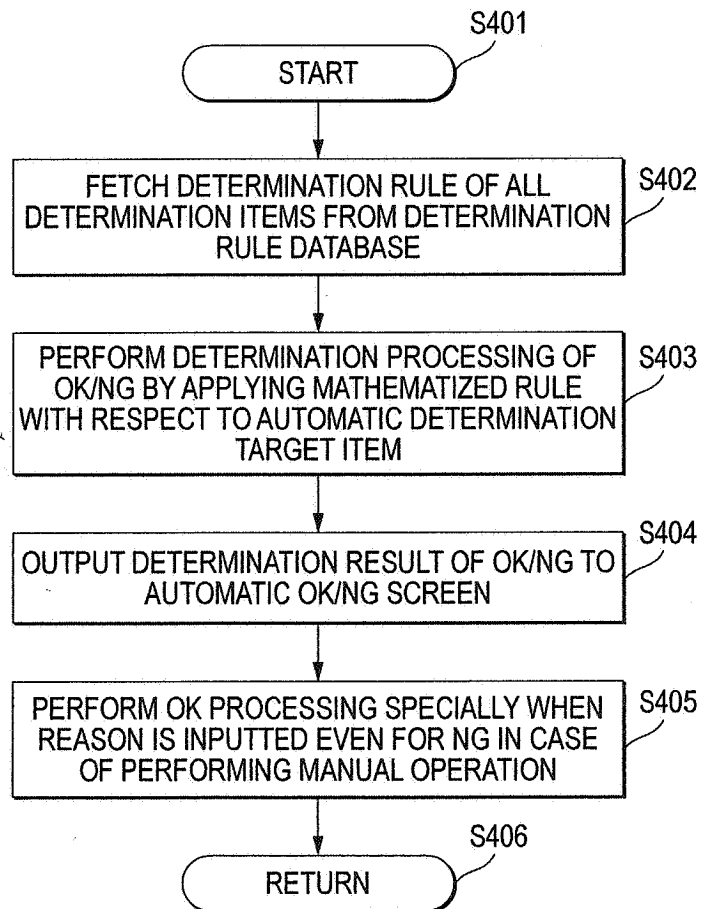
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FIG. 3



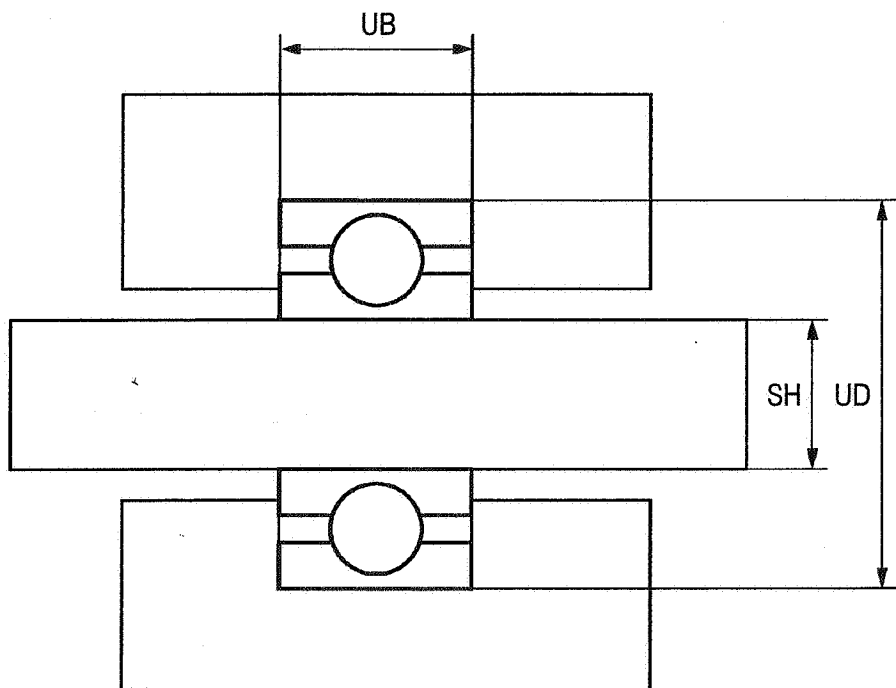
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FIG. 4



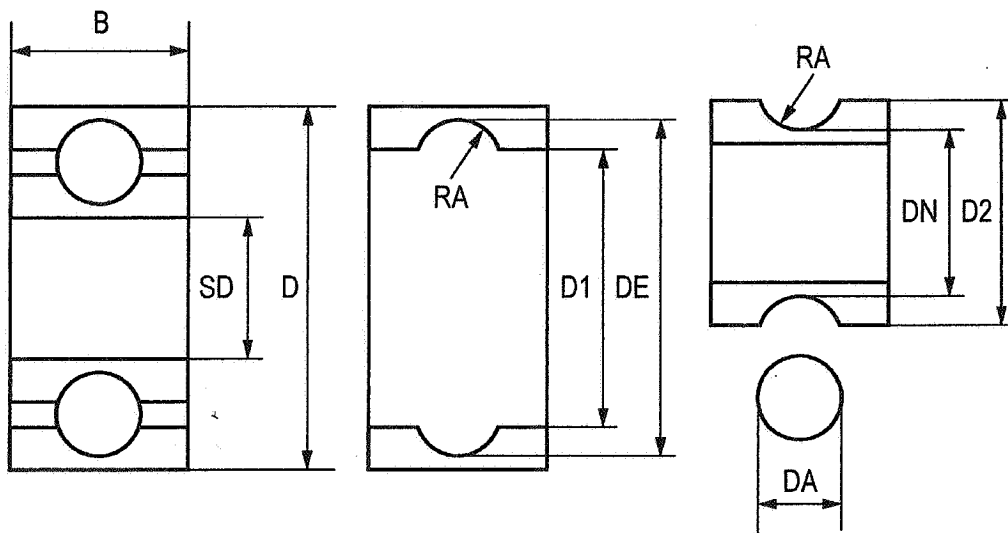
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FIG. 5



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FIG. 6



DA = DESIGNER INPUT VALUE

B = HOUSING WIDTH INPUT VALUE

D = HOUSING DIAMETER INPUT VALUE

SD = SHAFT DIAMETER INPUT VALUE

RA = BY CALCULATION FORMULA OF DESIGN RULE DG001

$$D1 = (D - SD) * 0.6 + SD$$

$$D2 = (D - SD) * 0.4 + SD$$

$$DE = (D + SD) / 2 + DA$$

$$DN = (D + SD) / 2 - DA$$

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FIG. 7

DESIGN RULE EXPANSION	DESIGN VALUE AND PROBLEM AVOIDANCE RULE	ADVICE	BASIS MATERIAL	ITEM ID
<div>BEARING DOES NOT FUNCTION</div> <div> <div>GROOVE RADIUS IS IMPROPER</div> <div>BALL DIAMETER IS TOO LARGE</div> <div>BALL DIAMETER IS TOO SMALL</div> </div>	RA = DA * 55 / 100		AA PROVISION 001	DG001
	DA < = (D - SD) / 2 * 0.6	DECREASE BALL DIAMETER	Xx EXPERIMENT 002	DG002
	DA > = (D - SD) / 2 * 0.4	INCREASE BALL DIAMETER	REPORT 034	DG003

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FIG. 8

PROVISION NUMBER: NSK00123

DATE OF EFFECT: 2003/10/30

VERSION: 01-03

DESIGN REFERENCE OF GROOVE RADIUS AND BALL
DIAMETER OF BALL BEARING

1. SCOPE OF APPLICATION

A DESIGN METHOD OF A BALL BEARING DEFINED BELOW SHOULD BE
APPLIED TO DESIGN OF BALL BEARINGS FOR GENERAL USE EXCLUDING
BALL BEARINGS FOR SPECIAL USE DEFINED SEPARATELY.

2. SCOPE OF BALL DIAMETER (DA)

DECIDE A BALL DIAMETER SO AS TO SATISFY THE FOLLOWING TWO
FORMULAS IN ORDER TO AVOID A PROBLEM THAT THE BEARING DOES NOT
FUNCTION.

AVOIDANCE METHOD OF PROBLEM THAT BALL DIAMETER IS TOO LARGE

$$DA \leq (D - SD) / 2 * 0.6$$

ID = (DG002)

AVOIDANCE METHOD OF PROBLEM THAT BALL DIAMETER IS TOO SMALL

$$DA \geq (D - SD) / 2 * 0.4$$

ID = (DG003)

REFERENCE DOCUMENT: Xx EXPERIMENT 002, REPORT 034

3. CALCULATION METHOD OF GROOVE RADIUS (RA)

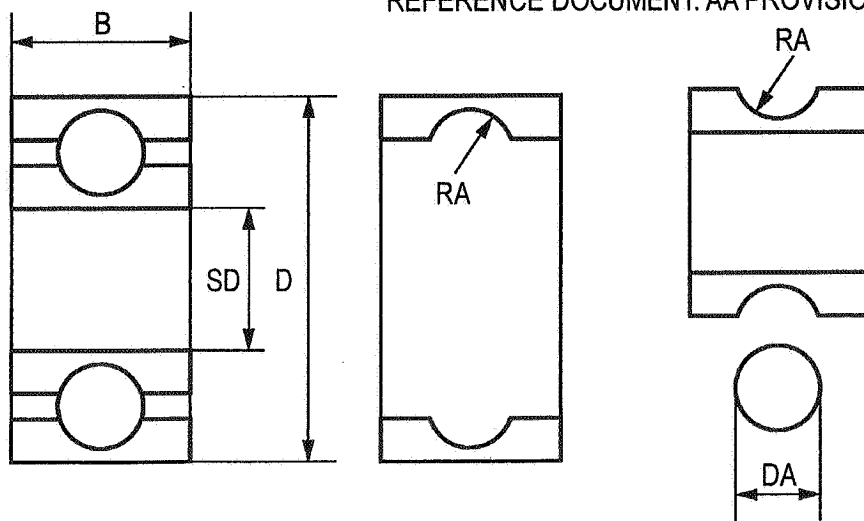
CALCULATE GROOVE RADII OF AN OUTER RING AND AN INNER RING BY THE
FOLLOWING CALCULATION FORMULA IN ORDER TO AVOID A PROBLEM THAT
THE BEARING DOES NOT FUNCTION.

CALCULATION FORMULA IN WHICH GROOVE RADIUS DOES NOT BECOME
IMPROPER

$$RA = DA * 55 / 100$$

ID = (DG001)

REFERENCE DOCUMENT: AA PROVISION 001



Appl. No. 10/566,705
Docket No. Q92872
Submission of Replacement Drawings
Filed on September 29, 2006
Replacement Sheet

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FIG. 9

RULE NAME	DESCRIPTION OF RULE
COMPONENT INVENTORY COOPERATION RULE:	RULE OF, FOR EXAMPLE, PREFERENTIALLY SELECTING COMPONENT WITH A LARGER NUMBER OF INVENTORIES OR PRESENCE OR ABSENCE OF INVENTORY AT THE TIME OF SELECTION OF COMPONENT BUILT IN PRODUCT
PURCHASE COMPONENT SELECTION RULE:	RULE OF, FOR EXAMPLE, SELECTING COMPONENT CAPABLE OF BEING STABLY SUPPLIED, CHEAP COMPONENT FROM AMONG PURCHASE COMPONENTS SATISFYING CONDITIONS OF PRODUCT
MATERIAL SELECTION RULE:	RULE OF, FOR EXAMPLE, SELECTING MATERIAL CAPABLE OF BEING STABLY SUPPLIED, CHEAP MATERIAL FROM AMONG MATERIALS SATISFYING SAME CONDITIONS
TECHNICAL CONDITION RULE OF PRODUCER, FACTORY, LINE AND EQUIPMENT:	RULE OF CHECKING WHETHER TO SATISFY CONDITIONS THAT PROCESSING CAN BE PERFORMED IN ACTUAL PRODUCER, FACTORY, LINE AND EQUIPMENT AND PROCESSING IS EASY (CHEAP, QUICK)
OPERATIONAL STATE AND SCHEDULE RULE OF PRODUCER, LINE AND EQUIPMENT:	RULE OF PERFORMING DESIGN BASED ON PREMISE THAT CREATION IS PERFORMED BY AVAILABLE PRODUCER, FACTORY, LINE AND EQUIPMENT FROM AMONG PLURAL PRODUCIBLE PRODUCERS, FACTORIES, LINES AND EQUIPMENT IN CONSIDERATION OF AMOUNT OF BUSINESS OF PRODUCTION SCHEDULE STAGE
PHYSICAL DISTRIBUTION RELATED RULE:	RULE SUCH AS RULE OF LIMITING MAXIMUM DIMENSION OF PRODUCT BECAUSE OF PHYSICAL DISTRIBUTION (FOR EXAMPLE, IT BECOMES DIFFICULT TO PERFORM CONVEYANCE BY LAND ON OPEN ROAD WHEN EXCEEDING CERTAIN DIMENSION) OR RULE OF REQUIRING SCREW HOLE OF HOOK FOR TRANSPORT (FOR EXAMPLE, HEAVY LOAD)
ENVIRONMENTAL CONTROL-CAPABLE RULE:	RULE OF AVOIDING ENVIRONMENTAL PROBLEMS BY GIVING WARNING IN ORDER TO AVOID ENVIRONMENTAL PROBLEMS SUCH AS CONTENT OF ENVIRONMENTAL CONTROLLED SUBSTANCE IN PRODUCT OR EMISSION OF ENVIRONMENTAL CONTROLLED SUBSTANCE IN MANUFACTURING PROCESS
AFTER-SALES SERVICE-CAPABLE RULE:	RULE OF CHECKING WHETHER TO HAVE ENGRAVED MARKS ETC. FOR MAKING IT EASY TO REPLACE COMPONENT OR MAKING IT EASY TO GRASP REPLACEMENT COMPONENT SO AS TO EASE AFTER-SALES SERVICE AFTER PRODUCT IS DELIVERED TO CUSTOMER
CUSTOMER BASIS-CAPABLE RULE:	RULE OF CHECKING WHETHER TO SATISFY CONDITION NECESSARY TO SURELY OBEY ON A CUSTOMER BASIS THOUGH CONDITION IS NOT PRESENTED EACH TIME AS DESIGN CONDITION OF INDIVIDUAL PRODUCT
ILLEGAL EXPORT PREVENTION RULE:	RULE OF CHECKING WHETHER TO HAVE DESIGN ADAPTED FOR REGULATIONS INCAPABLE OF EXPORTING PRODUCT INCLUDING ADVANCED TECHNIQUE DEPENDING ON PARTNER COUNTRY SUCH AS OVERSEA CUSTOMER
PATENT INFRINGEMENT PREVENTION RULE:	RULE OF CHECKING WHETHER TO HAVE DESIGN FOR PREVENTION IN ORDER TO PREVENT DESIGN IN CONFLICT WITH PATENT OF COMPETITOR
ELECTRONIC DATA SYSTEM ADAPTATION RULE:	RULE OF CHECKING NAME NUMBERING, ACCURACY SPECIFICATION OF CAD DATA, ETC. AS TO WHETHER TO ADAPT TO SENDING AND RECEIVING OF IN-HOUSE OR CUSTOMER ELECTRONIC DATA SUCH AS FILE NAME OF DATA, DATA FORMAT WHEN DESIGN OUTCOMES ARE ELECTRONIC DATA OF CAD ETC.

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FIG. 10

NAME NUMBER	ITEM ID	DETERMINATION ITEM	DESIGN VALUE AND PROBLEM AVOIDANCE RULE	DESIGN VALUE	REFERENCE VALUE	AUTOMATIC DETERMINATION	FINAL DETER- MINATION	REASON
6304	DG001	GROOVE RADIUS IS IMPROPER	$RA = DA * 55 / 100$	11.0	11.0	OK	OK	
6304	DG002	BALL DIAMETER IS TOO LARGE	$DA < = (D - SD) / 2 * 0.6$	20.0	24.0	OK	OK	
6304	DG003	BALL DIAMETER IS TOO SMALL	$DA > = (D - SD) / 2 * 0.4$	20.0	16.0	OK	OK	
608	DG001	GROOVE RADIUS IS IMPROPER	$RA = DA * 55 / 100$	33.0	33.0	OK	OK	
608	DG002	BALL DIAMETER IS TOO LARGE	$DA < = (D - SD) / 2 * 0.6$	36.1	36.0	NG	OK	FACTORY
608	DG003	BALL DIAMETER IS TOO SMALL	$DA > = (D - SD) / 2 * 0.4$	36.1	24.0	OK	OK	

OK BY CONFERENCE WITH FACTORY

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FIG. 11

DESIGN CONDITION INPUT OF BEARING	
HOUSING OUTSIDE DIAMETER UD:	<input type="text" value="60.0"/>
HOUSING WIDTH UB:	<input type="text" value="20.0"/>
SHAFT DIAMETER SH:	<input type="text" value="20.0"/>
<input type="button" value="NEXT"/>	

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FIG. 12

DESIGNER DISCRETION PARTICULAR INPUT	
BEARING NAME NUMBER:	<input type="text" value="6200"/>
BALL DIAMETER DA:	<input type="text" value="16.0"/>
<div><input type="button" value="RETURN"/> <input type="button" value="NEXT"/></div>	

FIG. 13

DESIGN RESULT	
NAME NUMBER:	<input type="text"/>
SD:	<input type="text"/>
D:	<input type="text"/>
B:	<input type="text"/>
D1:	<input type="text"/>
D2:	<input type="text"/>
DA:	<input type="text" value="16.0"/>
RA:	<input type="text"/>
DE:	<input type="text"/>
DN:	<input type="text"/>
	<input type="button" value="HELP"/>
	<input type="button" value="RETURN"/>
	<input type="button" value="NEXT"/>

DESIGN HELP

DESIGN HELP					
NAME NUMBER	ID:	DETERMINATION ITEM	ADVICE		
6200	DG002	BALL DIAMETER IS TOO LARGE	DECREASE BALL DIAMETER OK		
NAME NUMBER	CONDITION RULE	DESIGN VALUE	REFER- ENCE VALUE	AUTO- MATIC DETER- MINATION	FINAL DETER- MINATION REASON
6304	$DA \leq (D - SD) / 2 * 0.6$	20.0	24.0	OK	OK
608	$DA \leq (D - SD) / 2 * 0.6$	36.1	36.0	NG	CONFERENCE WITH FACTORY

FIG. 15

DESIGN OK/NG DETERMINATION									
ITEM ID	DETERMINATION ITEM	DESIGN VALUE AND PROBLEM AVOIDANCE RULE	DESIGN VALUE	REFER- ENCE VALUE	AUTO- MATIC DETER- MINATION	FINAL DETER- MINATION	REASON		
DG001	GROOVE RADIUS IS IMPROPER	$RA = DA * 55 / 100$	5.5	5.5	OK	OK			
DG002	BALL DIAMETER IS TOO LARGE	$DA < = (D - SD) / 2 * 0.6$	10.0	12.0	OK	OK			
DG003	BALL DIAMETER IS TOO SMALL	$DA > = (D - SD) / 2 * 0.4$	10.0	8.0	OK	OK			

THE NUMBER OF OKS:

THE NUMBER OF NGs:

FIG. 16

